# Module 7 - Strain Gauges

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering

Tennessee Technological University

## Topic 1 - Measuring Strain

# Topic 1 - Measuring Strain

- Motivation in Design
- Stress and Strain
- The Strain Gauge
- Engineering Applications

# Motivation in Design

The design of load-carrying components for machines and structures requires information concerning the _____. Proper design of devices such as shafts, pressure vessels, and support structures must consider _____. Mechanics of materials provides a basis for predicting these essential characteristics of a mechanical design, and provides the fundamental understanding of the behavior of load-carrying parts.

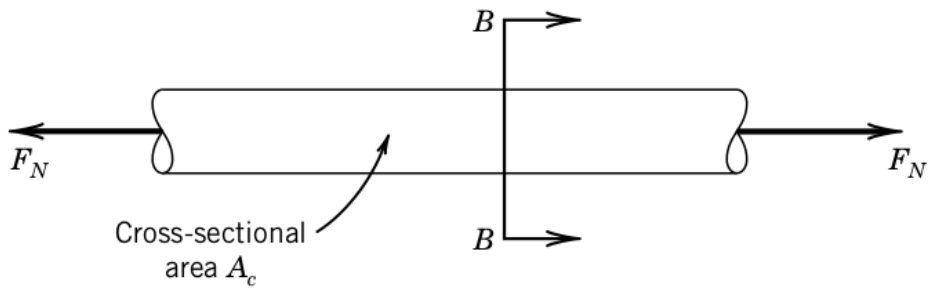
_____

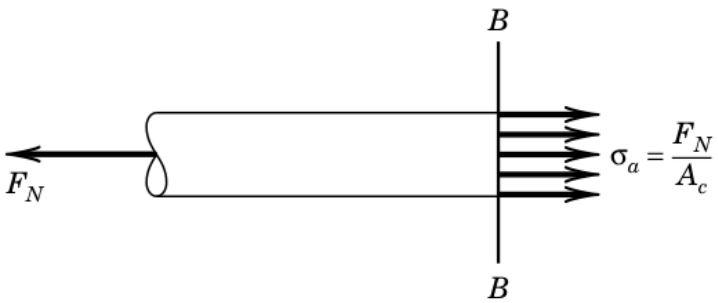
_____

Text: Theory and Design of Mechanical Measurements

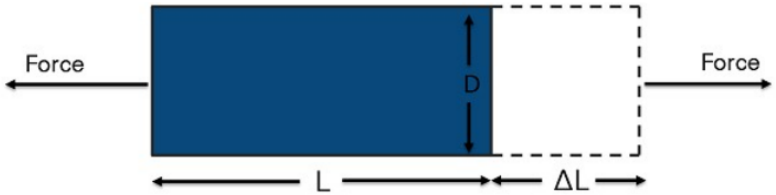
# Stress and Strain

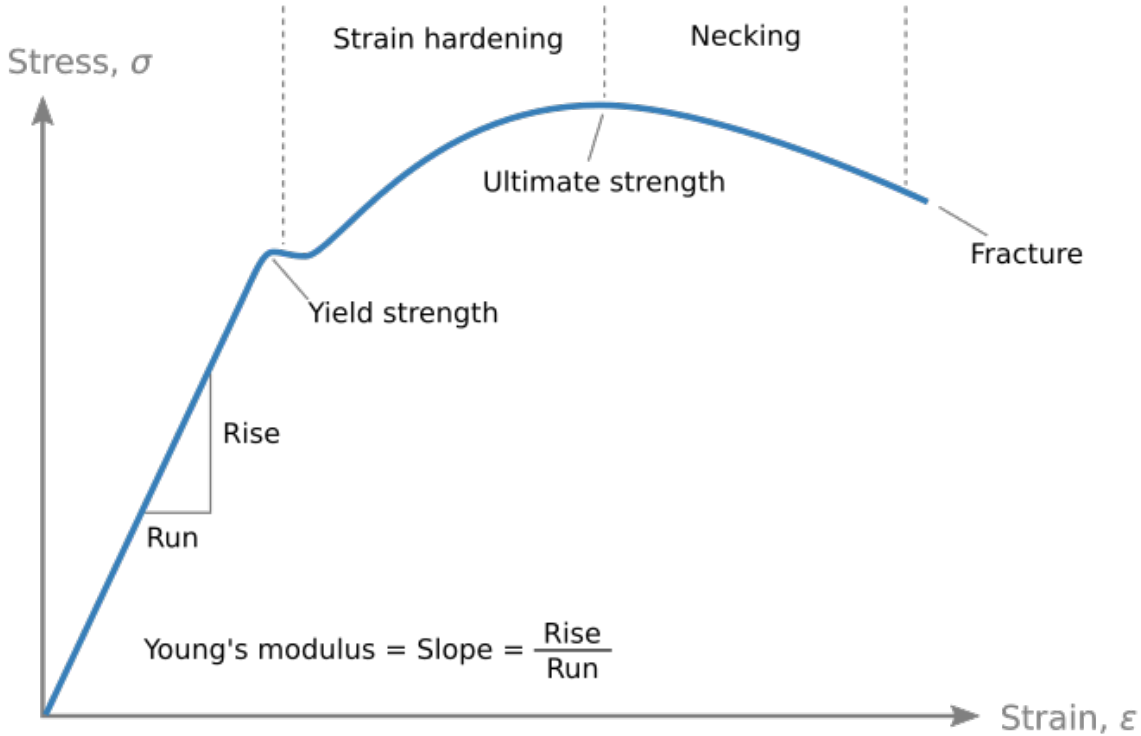
Consider a member under uni-axial loading. The _____is defined as the ratio of the _____to the _____of the component.



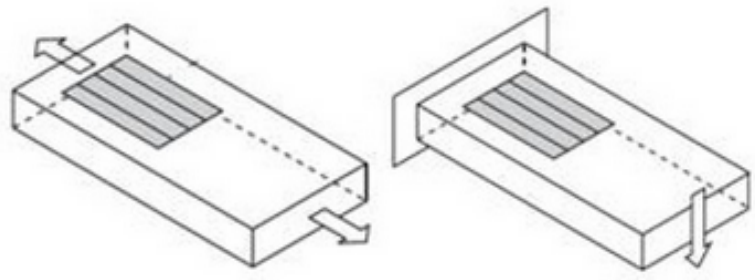
# Stress and Strain



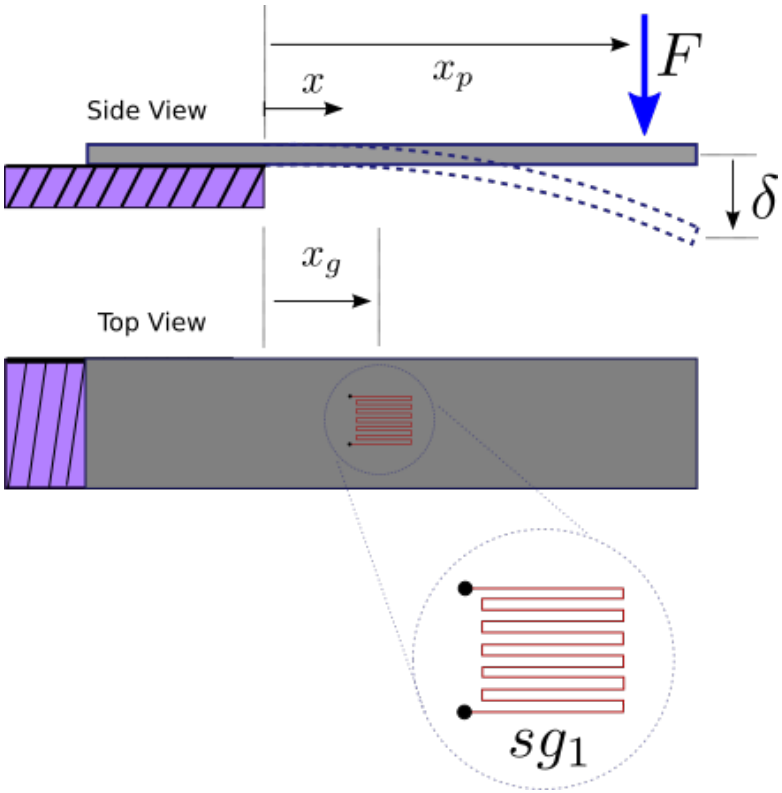
# The Strain Gauge

... the ideal sensor for the measurement of strain would (1) have good spatial resolution, implying that the sensor would measure strain at a point; (2) be unaffected by changes in ambient conditions; and (3) have a high-frequency response for dynamic (time-resolved) strain measurements. A sensor that closely meets these characteristics is the bonded resistance strain gauge.



# The Strain Gauge

Strain gauges can be mounted in different ways for different purposes. We will begin with a single gauge mounted in the axial direction.



# Engineering Applications

- Segway back to *Motivation in Design* (Slide 1) ...
- Aerospace
- Infrastructure
- Please read this article here. We will cover the mathematics and theory in class but this article has a short section on applications of strain gauges that I want you to see.